"Implicit Action": Understanding Discourse Management in Modeling Instruction

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Abstract: We present "Implicit Action", a discourse management tool, through a qualitative video analysis of a Florida International University Modeling Instruction Introductory Physics I class. Implicit Action in Modeling Instruction is where instructors deliberately create intellectual space in which students ideally see value and need for the construction of new classroom norms and tools that are productive in developing a learning community. This space is created by the implications expressed through the instructors' deliberate actions. Discourse Management is a technique to moderate student discourse in Modeling Instruction classes at the university level that was initially described by Desbien [1]. Implicit Action is one of 9 Modeling Discourse Management tools that we have identified. By means of qualitative analysis we illustrate the effectiveness of Implicit Action in implementing the Modeling Theory of Instruction.

Keywords: socio-cultural, instructor, group learning.
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INTRODUCTION

In this paper we will look at the Modeling Discourse Management tool, "Implicit Action" and how it is used to promote the development of social norms in a Modeling Instruction classroom. Implicit Action is not unique to Modeling Instruction, nor are the benefits of using this tool to promote student-centered discourse. An Implicit Action is any act intentionally designed to influence a person or group without explicitly communicating the desired results. In the context of the classroom, an Implicit Action is where instructors deliberately create intellectual space in which students ideally see value and need for the construction of new classroom norms and tools that are productive in developing student-centered discourse.

We consider classrooms to be cultural systems, which are constituted by norms of behavior that arise out of the repeated use of shared practices [2]. A useful description of the system includes: The instructor, the community, and the students individually. The student as an individual embodies what they believe to be the Nature of Science, their epistemology, and the relevancy the class holds in their life. The Community is a combination of the structure of the learning environment including the curriculum and the pedagogy of the class. In Modeling Instruction, the Modeling Theory of Instruction [3] describes the community component. Our focus in this analysis pertains to the instructor. The instructor as a component of the system can be described by the method of interaction that takes place between the instructor and the students.

Interactions between the instructor and students enact the pedagogy. Prior research has suggested the need for a more detailed account of how instructors use their knowledge of educational innovations and situational constraints to arrive at practical decisions in the moment-to-moment demands of the classroom when implementing any educational reform [2]. Instructors, coming from traditional lecture backgrounds are challenged in developing the social norms of the student-centered discourse that aligns with the student-centered pedagogy as they begin to implement Modeling Instruction. As we create professional development for Modeling Instruction we will address this concern by identifying and analyzing the method of interaction that an instructor uses in successfully achieving the student-centered discourse of a successful Modeling Instruction classroom.

THE MODELING INSTRUCTION CLASSROOM

In a Modeling Instruction class, students work in groups of 3 or 4 to complete assignments, labs,

handouts, and then meet in a larger group (24-32 students) white board meeting, where they come to a consensus. The environment looks very different when compared to the common traditional lecture. Students receive implicit messages from the environment that elicit group learning behavior or at least students are unlikely to expect a traditional lecture [4]. Students receive similar implicit and explicit messages from the instructor. Therefore, if the instructors' role does not send messages consistent with the intentions of the curriculum or pedagogy, the students' ability to adjust to the new social and cultural environment can be compromised. During the first few weeks of class it is essential that the social and cultural environment is established and consistently maintained by the interactions between the instructor and the students. As suggested by Redish, being aware of the difference between the students' expectations of our class and our own expectations can help us negotiate the social and cultural environment of the classroom with our students [4]. By this notion, we are aware of the difficulties students have establishing the social norms of Modeling Instruction, especially with the structure of the classroom and student-centered Modeling Discourse. This is the purpose of the development of Modeling Discourse Management.

MODELING DISCOURSE MANAGEMENT

In Modeling Instruction we refer to the method of interaction between the instructor and students as Modeling Discourse Management, which was initially described by Desbien [1]. Modeling Discourse Management is the methods and tools by which the instructor facilitates the Modeling Theory of Instruction [3] in the classroom. Implicit Action is one such tool and student-centered discourse is the component of the Modeling Theory of Instruction that this tool facilitates.

The interactions taking place during the act of Implicit Action involve an exchange of information that is reciprocal between the instructor and students. To illustrate the intended nature of Modeling Discourse we have included an interaction diagram (Fig. 1) created by Desbien [1]. Implicit Action does not explicitly communicate to the students the classroom norms the instructor wishes the students to adopt, but instead leaves intellectual space that encourages student behavior to align with the social norms of Modeling Discourse. This interaction takes place between the instructor and the students in a large group white board meeting. The meta-messages both implicitly and explicitly sent by the instructor to the students remain consistent with the student-centered discourse desired by the Modeling Theory of Instruction.

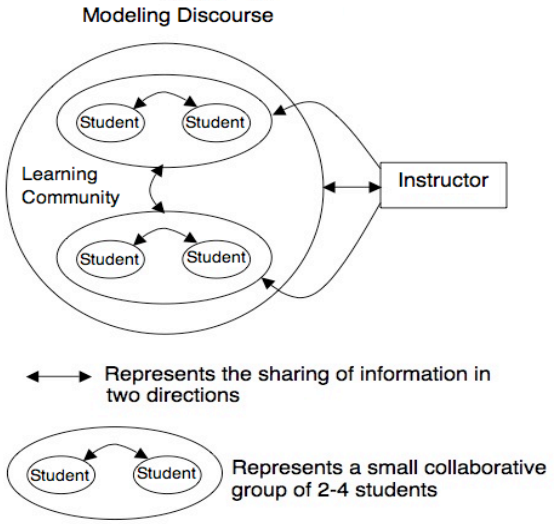

FIGURE 1. Desbien's diagram of Modeling Discourse [1]

RESEARCH DESIGN

In order to describe Implicit Action we have identified it in practice as it is used by an instructor who has been implementing Modeling Instruction for over twelve years and is known to have gains in both concept inventory assessments [5] and epistemic surveys [6].

Data Collection

We video recorded the fall semester of a 2010 Introductory Physics I course at Florida International University, where Modeling Instruction was implemented in the class of 30 students. Each day, two cameras were operated by two videographers, who individually chose one small group of students to follow each day, as well as capturing the large group meetings.

Method of Analysis

We have identified clips in which the act of Implicit Action takes place. By microanalysis [7] we then describe the event as it takes place in order to better understand Implicit Action and its role in establishing a student-centered discourse.

DEVELOPING SOCIAL NORMS THROUGH IMPLICIT ACTION

Video Segment 1

This segment takes place in the first week of classes. In the time leading up to this first segment, in small groups, the students have worked a series of problems. In their small groups on white boards the students provided solutions. Now as a class in a large group white board meeting, the small groups are presenting their solutions and discussing the model used to solve the assigned problems. This clip begins just after two problems have been presented and discussed.

FIGURE 2. A Screen shot from the beginning of video segment 1. Just after the instructor speaks.

1 **Inst.:** Ok, Number 3. (*spoken from outside of circle*) (*walks away from circle with back to students*) (*students are focused on each other and silent for 20 seconds*)
2 **S1:** Ok.
3 **S2:** You can go first. (*looking at student 1*)
4 **S3:** (*Inaudible*) (*giggling*)
5 **S1:** It tells you first that a ball is going… upward at a speed of 7 meters per second. So you know our initial velocity is 7 meters per second.

In this example, the intellectual space provided by the instructor relates to the social norms of the Modeling Instruction classroom. The 20 seconds of silence that occurs (line 1) after the instructor speaks is an indication that students are not yet aware that discourse is student-centered. This is not the same as "wait time". The instructors' silence is not because he is waiting in anticipation of an answer to a specific question, instead, without explicitly stating so, the instructor has provided the intellectual space the students need to have student-student discourse through his actions that also provide actual physical space (Fig 2). Implicitly the instructor signals to the students that they are discussing the problem and his interaction is not necessary by being outside of the large group circle (line 1) and explicitly walking away. .Without the immediate presence of the instructor (Fig 2), we see in the video the students start to physically look to each other and their body language as a group is focused toward the center of the circle. This is apparent in the direction of the students gazes seen in Fig 2. The students' gazes are toward the other students in the group or towards the center of the circle. Through analysis of the video clip the students bodies themselves are turned inward toward the center of the circle as well.

Video Segment 2

This segment takes place during the second week of classes. In the time leading up to this next segment, students have completed a lab in their small groups. Using motion sensors and Logger pro software. The students experimented with walking toward and away from the motion sensor at a steadily increasing rate. The students were asked to compare the resulting position versus time graphs, velocity versus time graphs, and acceleration versus time graphs. Next, the small groups of students were asked to write on their white board what they learned, what rules they could make, and what questions they had. Finally, the students brought their whiteboards to the large group meeting and after discussing the rules they developed have not established a consensus. The instructor enters the circle and lays down a white board in the center of the circle on which he draws two velocity versus time graphs of which one has a much steeper slope.

FIGURE 3. A screen shot from the beginning of video segment 2

Inst.: Both of them start from rest.
9 (*Instructor is kneeling down drawing on white board in center of large group as he speaks*) (*Instructor stands and drops markers next to white board as he speaks*) Those are the acceleration versus time graphs… Velocity versus time graphs. (*Instructor exits circle but remains close*)
10 **S4:** Um, we know that they have positive slopes.
11 **Inst.:** You know they have a positive slope. How do you know that?
12 **S4:** Because their acceleration is positive.
13 **Inst.:** Ok, so they've got positive slope. What else can we say about their slope?
14 **S5:** Uh, the green one is accelerating twice as quickly as the red one.
15 **Inst.:** Its got, Its got.. So what does that mean about the slope of it? (*Several students remark about steepness*)
16 **Inst.:** It has to be steeper. All right, what else can you say about the slope?
17 **S6:** They're both constant.

18 **Inst.:** They're both constant. So can we sketch those on there?
(*Instructor turns and walks away from large group*)….. (*Inaudible student murmurs*)
19 **S7:** I'll do it.
20 **Inst.:** All right, Thank you.

FIGURE 4. A screen shot from the end of video segment 2.

The segment begins where the instructor has entered the circle (Fig. 3). This is a distinctively different interaction with the group then when outside the circle (Fig. 4). The students' focus is now seen to be on the communicating to the group that he wishes to participate, as he is now physically part of the large group circle. We see through the transcript that he is directly influencing the discourse in response to a difficulty he identified in student understanding (lines 10-17). The discourse is no longer student-centered, now the students are responding to questions proposed by the instructor. He then signals a return to student led discourse by exiting the circle and explicitly walking away (line 18) (Fig. 4). Once the instructor turns away from the group, we can see in the video, the students' gaze is on the student drawing on the whiteboard in the center of the circle and they began to once again talk to each other rather than the instructor.

The intellectual space created can be described as a need for the students to develop a unique role for the instructor much different than that of a traditional instructor. The Modeling Instruction instructor is "transient" and his physical position, in respect to the large group circle, influences the large group interaction.

CONCLUSIONS

We suggest that over time, with consistency on the part of the instructor, a social norm is established through repeated interactions like these presented here. The large group whiteboard meeting is student led and the instructors' absence from the circle is an indication of student ownership/responsibility of discourse. Likewise, when the instructor enters the circle the instructor is communicating to the students he wishes to participate in the discourse. Through development of this norm early in the semester, the instructor can smoothly transition into student-centered discourse, provide guidance, and exit smoothly.

Though Modeling Discourse Management as a whole is an intricate part of the design of Modeling Instruction. This analysis also shows the effectiveness of Implicit Action as a tool for any instructor that wishes to develop more student-centered discourse in any reform classroom with similar goals.

Modeling Instruction has shown to be effective in positively affecting both content knowledge [5] and attitudinal shifts [6] of students in Introductory University Physics classrooms. Through video analysis of experienced Modeling Instruction instructors we can identify and analyze all of the Modeling Discourse Management tools. This will allow for a comprehensive professional development resource that makes Modeling Instruction an accessible and viable Introductory Physics reform option.

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